

FM 1-80

Reference

5/6 Page FM 17-35, 20 Aug 1962

FM 1-80

AERIAL OBSERVER TECHNIQUES AND PROCEDURES

DEPARTMENT OF THE ARMY FIELD MANUAL

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JULY 1974



I believe that the Army of today has a much keener appreciation for the value of observation aircraft than did most of our commanders in World War II. I used light planes frequently in both training and combat situations in World War II because they permitted me to observe in a few minutes what it would have taken days to observe by any other means. I found invaluable the panorama of the terrain and the dispositions of forces that I could quickly fix in my mind when I could observe from the air. Then when I later studied the situation on a map, I could envision much more clearly the exact lay of the land. This was tremendously helpful in the overall direction of the Fifth Army and it was of particular value in evaluating terrain and its influence on the courses of action I selected.

General Mark W. Clark

FIELD MANUAL

No. 1-80

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC, 30 July 74

AERIAL OBSERVER TECHNIQUES AND PROCEDURES

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CHAPTER 1

INTRODUCTION

1-1. Purpose. This manual explains the techniques and procedures used in visual aerial observation and provides information from which basic aerial observer skills may be developed.

1-2. Scope. *a.* This manual is intended for use by commanders, staff officers, aviators, and aerial observers for planning and conducting aerial observation missions.

b. This manual describes the planning and conduct of aerial observation missions and the techniques used. The discussion contained herein is focused on visual aerial observation methods.

1-3. Threat and Survivability. *a.* The encounter of a sophisticated enemy air defense system constituting a high threat environment can be anticipated on future battlefields. This system will include weapons ranging from individual heat-seeking antiaircraft weapons to radar controlled surface-to-air missiles. The component weapons of this system will be deployed in depth throughout the enemy area. The emplacement of the various weapons of the system will be arranged so that the fields of fire overlap. This overlapping of fields of fire will result in almost continuous coverage of the enemy area from the surface to an altitude of several thousand feet. Additionally, the emplacement of the various weapons will insure overlapping coverage of the battlefield from behind the friendly FEBA to the enemy rear areas by target acquisition equipment and visual observation.

b. When operating in a high air defense threat environment such as described above, survivability becomes a decisive factor in planning all aviation missions. Survivability in this type environment depends on avoiding detection and preventing tracking by either electronic or visual means. These two requirements of survivability can best be met by employing the technique of nap-of-the-earth (NOE) flight. NOE flight is characterized by varying airspeed, altitude, and course based on the terrain. In this technique, the course is selected to take advantage of the natural masking effect of the vegetation and terrain. The altitude used will vary with the vegetation and terrain as this technique stresses minimum safe obstacle clearance. The airspeed will also vary depending upon the type terrain, familiarity of the pilot with the area, and

on observation missions, the time required by the observer to cover a given point. The use of NOE techniques results in brief periods of exposure of the aircraft and extreme difficulty of predicting when or where this exposure will occur. This, in conjunction with the reaction time necessary to engage a target with the various antiaircraft weapons, will make it almost impossible to effectively engage aircraft employing NOE flight techniques, thereby increasing survivability.

1-4. Objective and Missions of Aerial Observation and Training Responsibility. *a.* The objective of aerial observation is to provide timely information to the commander through missions performed by Army aircraft carrying aerial observers. Aerial observation is characterized by the ability to operate free of terrain interference, to conduct observation over large areas, and to adjust rapidly to new requirements.

b. Aerial observation is employed in—

- (1) Aerial surveillance.
- (2) Aerial reconnaissance.
- (3) Special missions.

c. Commanders are directly responsible for the conduct, efficiency, and results of aerial observer training within their organizations.

(1) *Authority.* AR 600-106 authorizes flight status for observers.

(2) *Qualifications.*

(a) AR 40-501 prescribes the physical requirements for aerial observers.

(b) Army Subject Schedule 1-8 provides detailed guidance on training qualified aerial observers.

1-5. Observation Methods. The two methods used to conduct aerial observation are—

a. Visual Observation, which is observation by trained observers and flightcrews, sometimes aided by the use of binoculars, mechanical ranging devices, or light amplification devices.

b. Surveillance and Reconnaissance by Electronic or Photographic Means, which is collecting information through use of aircraft equipped with cameras and various electronic devices, such as radar and infrared sensors. See FM 30-20 for a detailed discussion of this method.

1-6. User Comments. Users of this manual are encouraged to submit recommended changes

and comments to improve the publication. Comments should be keyed to the specific page, paragraph, and line of the text in which the change is recommended. Reasons should be provided for each comment to insure understanding and complete evaluation. Comments

should be prepared using DA Form 2028 (Recommended Changes to Publications and Blank Forms) and forwarded direct to the Commandant, United States Army Aviation School, ATTN: ATST-CTD-D, Fort Rucker, Alabama 36360.

CHAPTER 2

BASIC PRINCIPLES

2-1. Tactical Application of Aerial Observation.

a. Army aircraft are employed by the commander to supplement his ground observation means and to improve the observation capabilities over his area of influence and interest. Observation coordinating both aerial and ground means provides the commander a more complete coverage of his area of influence and interest.

b. Aerial observation is an inherent part of all unit missions. Commanders should consider this potential in their intelligence collection efforts.

2-2. **Capabilities.** Aerial observation, when properly employed, increases the combat effectiveness of the ground unit by—

a. Providing greater observation coverage and greater security within the commander's area of influence and interest.

b. Avoiding the obstacles and other restrictions normally encountered in ground observation and reconnaissance.

c. Accelerating the accumulation, reporting, and dissemination of information by extending its ground reconnaissance capability.

2-3. **Limitations.** Factors that limit and affect the accuracy and completeness of the information obtained by aviator-observer teams are—

a. Weather. Weather conditions which produce poor visibility may affect accuracy and completeness of information or prevent its collection by visual observation methods. Use of electronic or photographic observation methods, such as side-looking airborne radar and infrared devices, can lessen the effect of this limitation, provided the aircraft can be operated along the desired flightpath.

b. Air Defenses. Sophisticated enemy air defense systems, to include radar directed automatic weapons and man-portable antiaircraft missiles, will present a serious threat to observation aircraft. Nap-of-the-earth flight techniques, making full use of available cover and concealment, will be required to counter this threat.

c. Flight Altitudes. During low-level flight operations (low-level, contour, and nap-of-the-earth), special problems arise. Terrain masking at these altitudes restricts the features which can be used for navigation and thus impacts heavily upon the graphic orientation and object

location skills of the observer. These problems increase in magnitude as the pilot decreases altitude and changes flight technique from low-level flight to contour flight and they are acute in nap-of-the-earth flight. In an environment of high threat from enemy air defenses, the problems associated with nap-of-the-earth flight and the resultant degradation of the accuracy of aerial observation information will have to be accepted as a normal trade off for survivability.

d. Loss of Secrecy. Increased aerial activity over a specific area may indicate to the enemy the intentions of the ground commander. Proper employment of counterintelligence measures and careful cover and deception planning of observation missions will lessen the effect of this limitation.

e. Terrain. The primary terrain limitation involves those areas having dense vegetation such as jungles, and areas having terrain obstacles such as high hills or mountains which mask or restrict visual observation. Terrain masking may seriously hamper the observer's capabilities, especially during low-level flight operations.

f. Night and Reduced Visibility. The hours of darkness and periods of reduced visibility caused by smoke, haze, fog, dust, etc., may reduce the effectiveness of visual observation. Since electronic or photographic observation methods are affected less by these limitations, they may be used more extensively than visual methods during these periods of reduced visibility and at night. Illuminating flares and/or searchlights may be used for night observation missions.

g. Radio. Aerial observation operations rely heavily on radio. Indiscriminate use of radio without employing proper communications security procedures can lead to the compromise of aerial observation missions and thus reduce their effectiveness. The use of radio when making reports of critical information is particularly susceptible to enemy electronic countermeasures (i.e., interception, jamming, and deception) unless aviator-observer teams are proficient in electronic counter-countermeasures. (See FM 32-5 for details on communication security. Electronic countermeasures and electronic counter-countermeasures are discussed in FM 24-18 and FM 32-20.) In addition communica-

tion at NOE in a high air defense threat environment will be severely affected due to line-of-sight requirements for radios. This problem should be addressed and solved in the planning stage; e.g., commitment of an aircraft to operate at an appropriate altitude behind the FEBA and act as a radio relay station or selection of communication points over high terrain features which will be overflowed along preselected routes.

2-4. Aerial Surveillance, Aerial Reconnaissance, and Special Missions. Visual aerial observation missions can be grouped into three categories. The first two, aerial surveillance and aerial reconnaissance, are very similar. The distinction is made based on the size of the area covered and how often the area is covered. Surveillance missions are flown on a periodic basis, with individual flights overlapping to insure complete coverage of the area, and characterized by the large expanse of terrain that they cover and the repetitiveness with which they are flown. Reconnaissance missions are flown to obtain specific information of military value, through detailed coverage of relatively small areas, without the requirement for continuous coverage. Other missions which normally orient on friendly activity may be requested by the commander. These missions are grouped under the category of special missions.

a. Aerial Surveillance. Aerial surveillance is the systematic observation of air or surface areas to obtain information to be processed into intelligence. Aerial surveillance missions provide the supported commander with current information by keeping a systematic and repeated watch over a well defined area for the purpose of detecting, identifying, locating, and reporting any information of military value. The major advantages of surveillance missions are their ability to—

- (1) Cover large areas rapidly and continuously with minimum expenditure of resources.

- (2) Observe movement or other changes as they occur on the enemy side of the FEBA to keep the commander continuously informed of significant enemy action.

- (3) Identify specific areas for further observation by either aerial or ground reconnaissance measures.

b. Aerial Reconnaissance. Aerial reconnaissance is a mission to obtain information about the activities and resources of an enemy or to secure data concerning the meteorological, hydrographic, or geographic characteristics of a particular area. A reconnaissance mission may be developed because of specific information indicating that an area has potential intelligence value or because current or planned operations

indicate a specific area warrants detailed coverage. These missions normally require penetration of the enemy airspace and are usually flown at low altitudes. The airmobility of the air cavalry squadron (FM 17-37) makes it ideally suited for reconnaissance missions to great depths and to areas inaccessible to ground units. The major advantage of aerial reconnaissance missions is the added detail they provide by concentrating observation capabilities on a specific area, and they are usually classified as either route or zone reconnaissance.

- (1) *Route reconnaissance.* Route reconnaissance is the careful survey of an air or surface route to determine enemy uses and traffic patterns. A route may be a road, a railroad, a waterway, an airspace, a coastal or an international border, or other lines of communication. Route reconnaissance may also be conducted to determine the adequacy of roadways, bridges, and other installations for friendly use. It is normally performed on a point-to-point or town-to-town basis over a selected route which may pass through several search areas.

- (2) *Zone reconnaissance.* A zone reconnaissance is a mission conducted to obtain specific information about a general area, monitoring any movement within an area, or detecting military activities. The limits of the area to be searched will be designated and will vary in size depending upon the tactical type terrain, information sought, and the enemy air defense threat. The aircraft crew must plan the actual flight pattern to be flown to insure complete coverage of the area and successful mission accomplishment.

c. Special Missions. Special missions are other observation missions that may assist the commander in the accomplishment of his missions. These missions include such tasks as contact reconnaissance, aerial column control, and camouflage inspection.

- (1) Contact reconnaissance is a mission undertaken to locate friendly units that are isolated or cut off from the main force; e.g., a long range patrol out of contact with higher headquarters.

- (2) Aerial column control is the airborne control of surface or airmobile columns by visual or radio contact to enhance rapid movement over unfamiliar terrain, detect obstacles, and to minimize the danger of surprise by the enemy.

- (3) Camouflage inspection is the aerial observation friendly units to determine the condition and effectiveness of camouflage. An effective program of camouflage inspection should include checks with photographic and infrared equipment as well as night flights to monitor light discipline.

CHAPTER 3

AERIAL OBSERVER TECHNIQUES

3-1. General. Visual aerial observation is primarily concerned with three basic activities—detection, identification, and location of objects on the ground. Associated with these activities are four essential skills.

Activity	Skill
Detection -----	Visual search (Techniques for sighting objects.)
Identification -----	Object recognition (Rapid recognition of objects and correct assignment of object name.)
Location -----	Graphic orientation (Rapid determination of observer position on map.) Object location (Accurate determination of sighted object's position on map.)

3-2. Visual Search. a. General. Visual search is the systematic visual coverage of a given area so that all parts of the area have passed within visibility. The purpose of visual search is to detect objects on the ground. The objects of interest are often fleeting and transient in nature. They may range in size from a foot soldier with a handheld weapon to the largest tactical missile and launcher or armor formation within the limits of tactical deployment. These objects may be located anywhere in the search area.

b. Factors Influencing Visual Search. The ability of an observer to effectively search a given area depends upon several factors. In addition to the limitations of the human eye itself, these factors are—

(1) *Altitude.* The higher the observation aircraft flies, the greater the amount of terrain available to the observer for inspection. While more terrain can be seen at high altitudes, a better visual coverage of the area immediately adjacent to the ground track of the aircraft is possible at lower altitudes. These lower altitudes will normally be used due to survivability considerations.

(2) *Airspeed.* Aircraft speed, so far as it concerns the observer, is the rate at which the terrain passes by the aircraft. If aircraft speed is held constant and the altitude is increased, the apparent rate of movement of the ground object is decreased. Conversely, as the altitude of the aircraft is decreased, the apparent movement of the ground object increases. An analogous situation would be an observer traveling at constant speed in an automobile. Objects close to

the highway appear as fleeting sightings, while those at a distance seem to move more slowly.

(3) *Terrain conditions.*

(a) The amount of area that can be covered effectively in visual search is largely dependent on the type of terrain. For example, searching over dense jungle growth does not permit the degree of visual contact with the terrain that is afforded over barren wastes such as the arctic or desert regions. Consequently, the amount of search area covered in a given time would be greatly reduced.

(b) The types of terrain which permit objects to be sighted more easily are roads; open, sandy areas; or fields. Because they are easier to cover visually, aerial observers often concentrate their attention upon open areas. However, it is possible to sight down through tree stands and through the adjacent low-lying shrubs and bushes.

(c) Terrain conditions often mask the object in such a way that it is exposed to aerial view for only a very brief period. This is particularly true for flights at nap-of-the-earth altitudes.

(4) *Clues.* In areas where natural cover and concealment make detection of objects a difficult task, clues may exist which will indicate enemy activity. If properly used, these clues will be of great value to the aerial observer. Some of these clues are as follows:

(a) *Color.* Differences in color are readily observable from the air. Color difference may result from the dying or wilting of either the foliage used for camouflage or the trees, shrubs, etc., from which the foliage was taken.

(b) *Texture.* Texture is a characteristic which results in light reflection or diffusion. Smooth surfaces, even though they are the same color as their surroundings, will appear lighter. Therefore, vehicles which are the same color as surrounding vegetation will appear lighter in color. Extremely smooth surfaces such as glass, in direct sunlight, will produce shine which is readily discernible to the aerial observer.

(c) *Shadow.* The shadows that are cast by manmade objects are highly distinctive, and a close look at the shadows in an area may reveal equipment that would otherwise go undetected.

(d) *Shape.* Manmade objects are charac-

terized by regular shapes and contours as opposed to a random pattern which occurs naturally. Therefore, regularly shaped objects or regular patterns of vegetation should be inspected closely.

(e) *Trails.* Trails leading into an area should be observed for clues as to type, quantity, and recency of traffic. The type tread marks present would, as a minimum, distinguish the traffic as either wheel or track vehicles. The width and depth of the ruts, and the apparent soil condition, in conjunction with the type vehicle would provide some information about the volume of traffic or weight of the vehicles. Information on recency of use could be obtained from such factors as dust still in the air around dry trails, water still seeping into the tracks on wet trails, etc.

(f) *Smoke.* Any smoke which appears in the area should be observed for color, smell, volume, and pattern of appearance. These characteristics can be used to indicate different sources of the smoke, e.g., billows of dark smoke appearing on hills along a road could indicate diesel driven vehicle traffic.

(g) *Noise.* When noise is audible above the sound of aircraft, it can also be used to indicate the type and direction of enemy activity.

(h) *Light.* At night, light is very useful for detecting enemy activity.

(i) *Movement.* The most easily detectable clue to enemy activity is movement. Even if all other clues are absent, movement can reveal the positions of enemy personnel and equipment.

(j) *Nature of the enemy.* If the enemy is skillful in the art of camouflage, the observer should be extremely cautious of overly obvious sightings. This lack of camouflage may be intentional due to high concentration of anti-aircraft weapons and little concern about aerial observation or to detract the attention of aerial observers from more important items of information.

3-3. Visual Search Techniques. *a. General.* Three techniques that provide systematic methods for conducting visual aerial observation are side scan, motive, and stationary. The technique used during a particular mission will depend on the altitude flown and the terrain encountered.

b. Side Scan Technique. The side scan technique (fig 3-1) is normally applied when the aircraft is operating at an altitude of 100 feet above ground level or higher. Below an altitude of 500 feet, the observer's line of sight is directed toward the horizon. Above 500 feet, the line of sight is directed downward. Over most terrain the observer systematically—

(1) Looks out toward the horizon approximately 1,000 meters and searches in toward the aircraft (step A).

(2) Looks out to one-half the distance (500

meters) and searches in toward the aircraft (step B).

(3) Looks out to one-fourth the distance (250 meters) and searches in toward the aircraft (step C).

(4) Repeats the above process.

Note. The rapidity at which the above steps are repeated depends on the speed of the aircraft. When an object is sighted, the observer should record the information as quickly as possible and then continue his systematic search.

c. Motive Technique. The motive technique (fig 3-2) is used when the observation aircraft is operating at nap-of-the-earth altitudes and at airspeeds of generally 10 knots or faster.

(1) In this technique the observation work sector is subdivided into two smaller sectors—

(a) *Acquisition sector.* The acquisition sector is the forward 45° area of the observation work sector. This is the observer's primary area of search in the motive technique.

(b) *Recognition sector.* The recognition sector is the remainder of the observation work sector to the rear of the acquisition sector. When an object is sighted in the acquisition sector, the sighting will be confirmed and identified in the recognition sector.

(2) In using the motive technique, the observer—

(a) Looks forward of the aircraft and through the center of the acquisition sector for obvious sightings (step A).

1. Over open terrain the observer should look as far forward as necessary to detect enemy direct fire threats to the aircraft.

2. Over heavy vegetated terrain the observer should look as far forward as he can detect the ground through the vegetation

(b) Scans left to right through the acquisition sector, gradually working back toward the aircraft (step B).

(c) Repeats steps A and B.

d. Stationary technique. The stationary technique (fig 3-3) applies to helicopters only. It is used at nap-of-the-earth altitudes with the helicopter hovering in a concealed position. The observer may use binoculars or ranging devices to aid in his search. Although the pilot may assist the observer in his visual search, the pilot's primary concern will be aircraft control, observing in close proximity to the aircraft, and insuring the aircraft remains concealed.

(1) *Sectors of search.* There are no clearly defined sectors of search in the stationary technique. However, if the search area is large, it may be divided into smaller sections.

(2) When using the stationary technique, the observer—

(a) Makes a quick overall search for obvious sightings, unnatural colors, outlines, or movements (step A).

(b) Begins a left to right scan to his immediate front, searching an area approximately 50 meters in depth (step B).

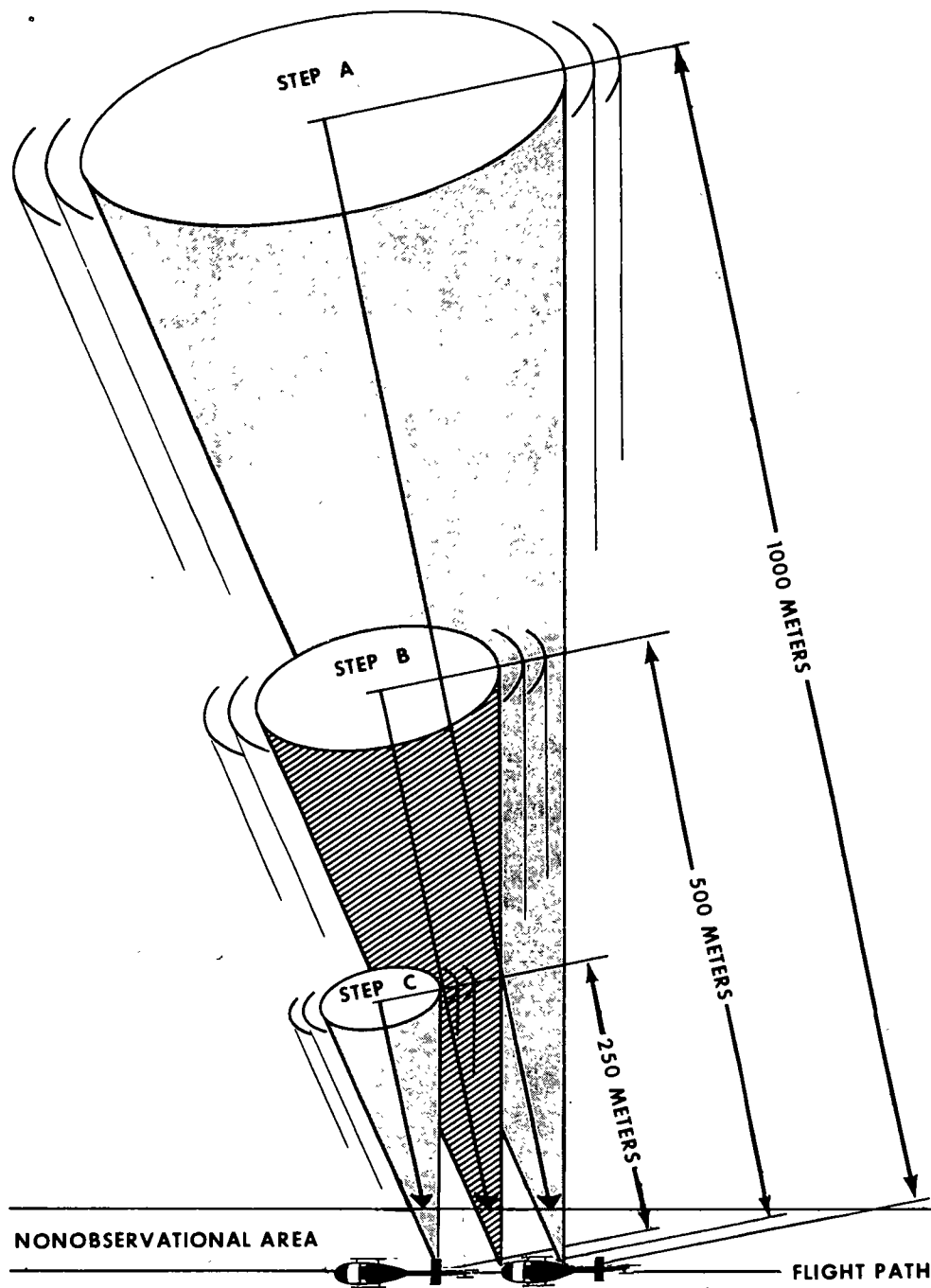


Figure 3-1. Side scan search technique.

(c) Continues to scan outward from the aircraft, increasing the depth of the search area by overlapping 50-meter intervals (step C).

(d) Repeats step C until the entire search area has been covered.

3-4. Object Recognition. Regardless of the observation technique employed, there are certain factors which affect the observer's ability to detect and identify objects. These factors determine the accuracy and completeness with which

visual aerial observation missions can be performed. They must be thoroughly understood by all persons concerned with the conduct of aerial observation and with training of aerial observers. For a detailed discussion of recognition factors see FM 5-20.

a. Experience. The amount of experience an observer has had in actually observing from an aircraft will largely determine his effectiveness. Therefore, realistic training flights should be an important part of aerial observer training.

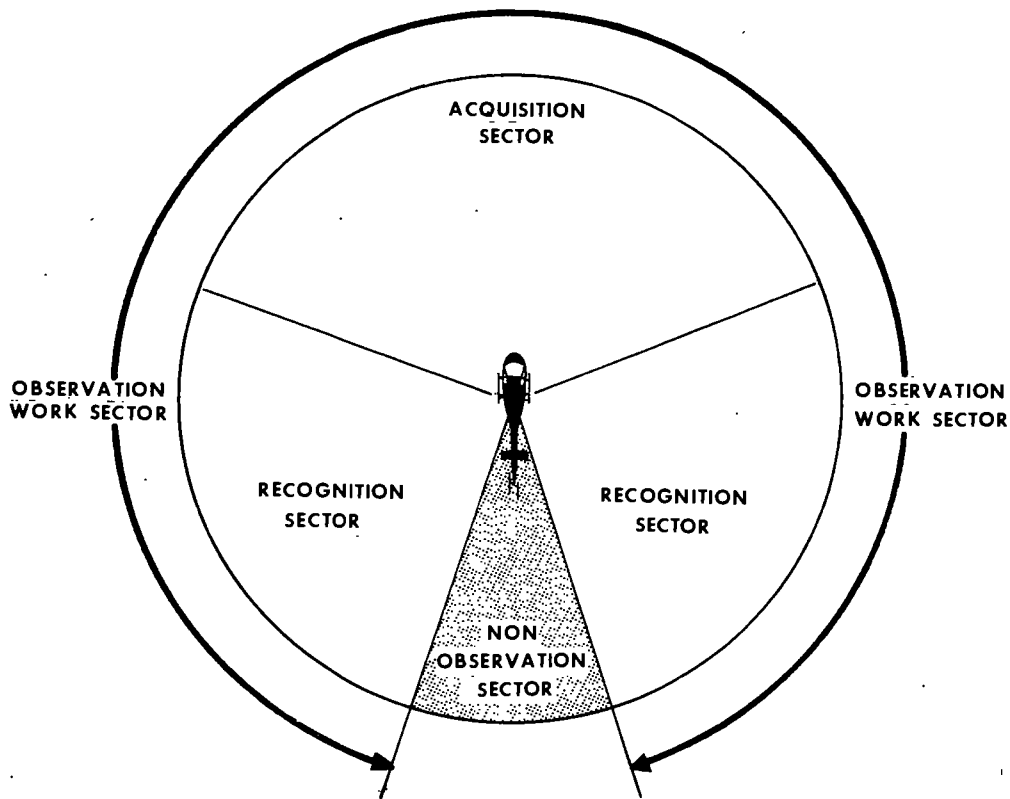


Figure 3-2. Recognition sectors, motive visual search technique.

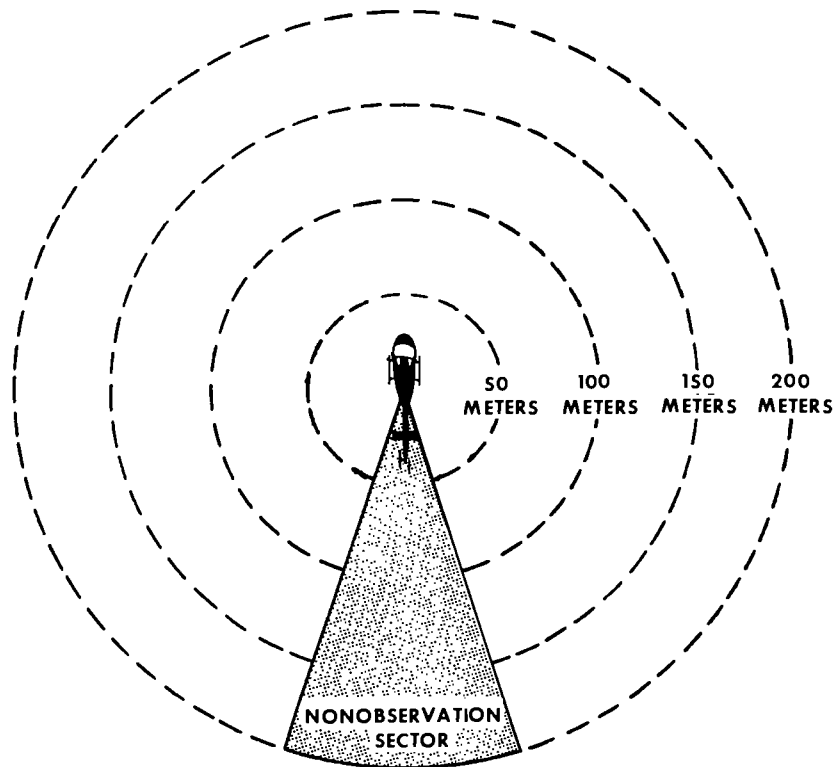


Figure 3-3. Stationary search technique.

b. Distance. As the distance between the observer and an object increases, the ability of the human eye to recognize distinctive characteris-

tics of the object decreases. Therefore, effective training must include slides and photographs of different objects at varying distances. Table 3-1

shows approximate maximum recognition distances for various items of equipment. This table is intended to give the observer some concept of the size versus recognition distance relationship. Therefore, only United States equipment has been listed because most soldiers are familiar with these items. It should be noted that items of foreign equipment will have recognition distances equal to that of comparable sized US equipment, e.g., heavy tanks. Both the US Army M-60 tank and the Russian main battle tank have recognition distances of 925 meters.

Table 3-1. Approximate Recognition Distances

Object	Slant range (meters)
Gun, machine, 7.62mm -----	100
Launcher, rocket, 3.5-inch -----	175
Mortar, 81mm -----	200
Gun, machine, cal .50 -----	225
Personnel -----	300
Mortar, 4.2-inch -----	300
Rifle, recoilless, 106mm -----	300
Howitzer, 105mm, towed -----	600
Truck, utility, ¼-ton, 4 x 4 -----	600
Howitzer, 155mm, towed -----	900
Truck, cargo, ¾-ton, 4 x 4 -----	900
Howitzer, self-propelled, full-track, 155mm ---	925
Truck, cargo, 2½-ton, 6 x 6 -----	925
Tank, combat, full-track, M-60 -----	925

c. Position. The position of an object in relation to its surroundings often aids in detection and recognition. For example, a long object on a railroad track is assumed to be a train; objects on a river parallel to its banks are assumed to be boats or barges.

d. Shape. The general shape or outline of an object is recognizable from distances, at which its detailed composition cannot be determined. Trucks, guns, tanks, and other items of military equipment all have distinctive shapes which make them easily recognizable at considerable distances.

e. Shadow. An object's shadow may be even more revealing to a trained aerial observer than the object itself. Items such as factory chimneys, utility poles, vehicles, bridges, and tents all have distinctive shadows which are easily recognizable from the air.

f. Texture. Texture is a characteristic which results in light reflection or diffusion. Rough surfaces such as grassy fields reflect little light and cast shadows on themselves; consequently, they appear dark to the eye. Smooth surfaces such as airstrips or roofs reflect more light and appear lighter to the eye than similarly colored surroundings. Extremely smooth surfaces such as glass or metal may produce shine in direct sunlight and are easily detected by aerial observers.

g. Color. Contrast between the color of an object and that of its background makes the object more easily detectable to aerial observation.

Lighter shades of a given color will be more likely to attract an observer's attention than darker, less brilliant shades.

h. Movement. Movement of an object, even when all other recognition factors have been eliminated, will usually be easily detectable from the air. Good peripheral vision is a decided asset to an aerial observer in detecting movement.

i. Observer Response Time. Speed of the aircraft and the number of objects detected will determine the importance of observer response time. Observers should be trained to respond instantly when an object is sighted. Use of abbreviations in recording sightings will enable the observer to respond more efficiently. Each observer should develop his own method of abbreviating information he has sighted. These abbreviations can be either letters and numbers or graphics with numbers. For example, an observer may want to record the sighting of a gun, self-propelled, full-tracked, 175mm as 175 SP. Since these notations will be converted to a full description during debriefing, they need be understandable to only the observer.

j. Uniqueness of Objects. Uniqueness by type of many objects makes specific identification possible, depending upon the training an observer has received. The more extensively a training program employs recognition aids such as scale models, recognition charts, and photographs, the greater will be the observer's ability to identify objects specifically by type. The observer should be able to identify equipment of the Warsaw Pact nations such as antiaircraft weapons (both optical and electronic), radar, and missiles. In addition, he should be able to identify the NATO nations equipment. For a complete description of these items of equipment, see TB 381-5-1.

3-5. Graphic Orientation. *a.* Graphic orientation is the process whereby the observer becomes oriented to the terrain so that he knows his position relative to some graphic reference such as a map, chart, or aerial photograph. Using key terrain features (normally preplanned), the observer orients his map or other graphic reference so that he can rapidly shift from points on his map to corresponding points on the ground, and vice versa.

b. Graphic orientation should be emphasized in aerial observer training. The observer must learn to recognize a terrain feature on his map, orient himself in relation to that terrain feature, and locate objects on the ground with reference to the surrounding terrain.

c. Graphic orientation is extremely important when missions are flown at nap-of-the-earth altitudes. The problem of remaining oriented during this type of flight is difficult, and the observer's performance will be seriously degraded if he spends much time looking at his map instead of the terrain. A thorough study of

maps and photographs prior to the flight is essential.

3-6. Object Location. *a.* Object location is the transposition of a sighted object on the ground to a map or other graphic reference. The observer must be trained to rapidly and accurately pinpoint object positions on his map. Once an object has been sighted and its position fixed on the observer's map, the sighting must be rapidly recorded and reported. Reference numbers are assigned to sighted objects, and the information is normally reported by verbal means such as radio or recording devices.

b. Object location combines all aerial observer skills. The observer must be able to—

(1) See and recognize an object (search and recognition).

(2) Orient himself and the sighted object with reference to the surrounding terrain (graphic orientation).

(3) Locate the sighted object on a map (object location).

c. As with graphic orientation, object location skills become extremely important at nap-of-the-earth altitudes. The observer must know where he is at all times in relation to his map, so that sighted objects may be located on the map and recorded rapidly.

CHAPTER 4

AERIAL OBSERVATION PLANNING AND OPERATIONS

Section I. GENERAL

4-1. **Concept of Employment.** Aerial observation missions will be flown in support of operational requirements of the commander. The specific mission to be flown (surveillance, reconnaissance, or special) will vary with the intelligence requirements. During a single mission or flight, the aviator-observer team may be called upon to change from one mission to another or to perform more than one type of mission. For example, an aviator-observer team on a surveillance mission may be diverted to confirm a suspected object, thus changing the mission to one of reconnaissance; or the aviator-observer team on a reconnaissance mission may be told to perform a camouflage inspection, which changes the mission to *special*.

4-2. Command and Staff Responsibilities for Aerial Observation.

a. Intelligence Officer, G2(S2). The G2 (S2) has overall staff responsibility for the collection, production, and dissemination of intelligence, including that gathered from the air.

b. G2(S2) Air. The G2(S2) Air is responsible for the overall planning and coordination of the aerial observation effort within his command.

c. Commanders. Commanders are responsible for the training of personnel as aerial observers and the employment of available organic means in the execution of observation missions.

d. Aviation Officer. The aviation officer—

(1) Exercises staff supervision over technical and flight aspects of administration, training, safety, and operations of Army aviation units.

(2) Monitors the maintenance of aircraft and advises the commander, responsible staff personnel, and major subordinate commanders on the condition of equipment.

(3) Prepares the aviation portion of the training program and exercises special staff supervision over aviation training in the command.

(4) Plans and supervises the following Army aviation operations:

(a) Employment of aviation in combat and combat support operations.

(b) Establishment and operation of the air traffic regulation system.

(5) Assists the staff in preparing aviation portions of estimates, plans, orders, and reports.

(6) Prepares the aviation portion of the air movement plan; and in conjunction with the AD officer and other appropriate agencies, assists in developing the airspace utilization plan.

(7) Coordinates with transportation and movements staff personnel in matters requiring Army aircraft for combat service support operations.

e. Operations officer, G3 (S3). The operations officer is responsible to the commander for supervising aviation operations and processing, assigning, and planning of specific flight missions.

f. Aviator-observer teams. Aviator-observer teams performing aerial observation must be capable of providing timely response to the requirements of the combat intelligence system and complete and accurate information in the degree of detail requested. Aviator-observer teams must—

(1) Have a thorough understanding of the mission.

(2) Plan the mission.

(3) Supervise preparation of the equipment.

(4) Prepare and file the flight plan for the mission.

(5) Execute the mission.

(6) Prepare mission data for debriefing.

Section II. AERIAL OBSERVATION MISSION REQUEST AND ASSIGNMENT PROCEDURES

4-3. **General.** Aerial observation mission requirements may originate at any level of command. According to the time available, they are classified as either *preplanned* or *immediate* mission requirements.

a. Preplanned. Preplanned mission requirements are anticipated observation requirements. Unit standing operation procedures (SOP) will establish the cutoff time for the submission of preplanned mission requirements.

b. Immediate. Immediate mission requirements are unforeseen observation requirements. Normally, a portion of the observation air effort is allocated to meet immediate observation requirements as they arise. In the event additional assets are not available, preplanned missions will be adjusted to accomplish the higher priority mission.

4-4. Mission Request Procedures. All aerial observation mission requests are processed through intelligence channels.

a. Preplanned Aerial Observation. Any intelligence communications method (i.e., radio, wire, courier, etc.) may be used for requesting preplanned missions so long as the request arrives at the action headquarters prior to cutoff time established by SOP. All intermediate headquarters will take the necessary action to approve, disapprove, or modify requested preplanned missions.

b. Immediate Aerial Observation. Immediate mission requests from subordinate elements that have a tactical air control party (TACP) attached are transmitted over the Air Force immediate air request net directly from the requesting unit's TACP, bypassing any intermediate headquarters, to the direct air support center (DASC). Units that do not have a TACP will forward requests by the most expeditious means to the next higher headquarters, until they arrive at a headquarters with a TACP where the requests are inserted into the Air Force immediate air request net. The battalion, brigade, and division TACP's all monitor the Air Force immediate air request net. When a request is submitted over the net, intermediate headquarters will—

(1) Monitor and acknowledge receipt of the transmission.

(2) Remain silent after acknowledging receipt of the transmission, thereby signifying approval of the request.

(3) Enter the net to disapprove the requested mission.

(4) Enter the net to modify the requested mission.

Section III. MISSION PLANNING AND DUTIES OF THE AVIATOR-OBSERVER TEAM

4-7. General. After receiving an aerial observation mission assignment and the general and preflight briefings, the aviator-observer team plans the mission. This is the preflight planning phase, and consists of four steps—

a. Map and aerial photograph selection.

b. Terrain evaluation.

c. Flight planning.

d. Crew coordination.

4-8. Map and Aerial Photograph Selection. Only those maps and photographs necessary for the

4-5. Mission Assignment Procedures. The G2(S2) Air has overall staff responsibility for planning and coordinating the aerial observation effort of the command. Upon receiving an aerial observation request, the G2(S2) Air will, in the name of the commander, approve, disapprove, modify if necessary, and/or assign the mission to an aviation element for execution. For approved missions, the G2(S2) Air will determine the type of mission (reconnaissance, surveillance, or special) to be flown and the method of observation, visual or by electronic or photographic means, to be used to conduct the mission. For missions using electronic or photographic means, the G2(S2) Air may specify the type sensor to be used (photographic, radar, infrared, etc.). For a discussion of aerial surveillance and reconnaissance by electronic or photographic means, see FM 30-20. Preplanned missions will be assigned to units in the aerial surveillance and reconnaissance plan. Immediate missions will be assigned to units through normal command channels using any rapid means of communications available.

4-6. Briefing. To insure a thorough understanding of assigned missions, the aviator-observer team will receive general and preflight briefings.

a. A general briefing is given daily to all aviator-observer teams. Pertinent information relative to tactical operations for the next 24 hours is presented. This briefing aids in reducing the amount of information that must be presented at the preflight briefing.

b. The preflight briefing, which is conducted in conjunction with the assignment of the mission, includes all information relative to the conduct of the mission. The G2(S2) Air (or his representative) or an intelligence representative of the supported unit conducts the intelligence portion of the briefing. The flight operations officer conducts that portion of the briefing pertaining to aviation matters.

c. The general and preflight briefings may be conducted using the format of a 5-paragraph operations order.

conduct of the mission should be selected and carried by the aviator-observer team. These should be the most current available and of a scale that will facilitate navigation by the aviator and accurate locating and recording of information by the observer. For navigation, medium scale maps (1:100,000) will assist the aviator in flying from the forward assembly area or airstrip to the mission area. For observation, tactical scale maps (1:50,000) will aid the observer in accurately identifying and locating prominent terrain features by coordinates. The

scale of an aerial photograph should not be smaller than 1:20,000 and, depending upon the detail desired, may be as large as 1:5,000.

4-9. Terrain Evaluation. Preliminary analysis of the terrain to be covered is made from—

- (1) maps and photos,
- (2) past experience of the aviator and observer and their knowledge of the situation and the enemy,
- (3) viewpoints of other personnel with experience in the area, and
- (4) recorded information from previous missions. Areas known to contain enemy positions or activities are marked on the map or photo. Key terrain features, woods, and defilade areas are marked for close observation as possible locations for enemy strongpoints, field artillery positions, assembly areas, command posts, supply dumps, etc. Guiding factors in determining probable locations of enemy positions or activities in the areas of influence and interest include the following:

a. Strongpoints and observation posts can be expected in any area where the terrain offers a decisive advantage to the holder.

b. Field artillery positions normally are located in defilade.

c. Assembly areas usually are in wooded areas or other areas offering cover and concealment.

d. Supply installations have accessible road nets and, when possible, are out of range of artillery.

e. Roadblocks can be expected at narrow points along the routes of advance where bypass is difficult or impossible.

f. Command posts normally are located near good road nets, in defilade, and in areas containing good natural concealment. Presence of vehicles, troop shelters, and concentration of communication antennas usually indicates the location of a command installation.

4-10. Flight Planning. In flight planning, the aviator-observer team conducts a detailed map and aerial photograph study (para 4-8); selects primary and alternate flight routes, altitudes, and checkpoints; memorizes prominent terrain features; and prepares notes or a checklist as necessary to assist in accurate orientation and location. In addition, the following factors must be considered:

a. *Type Mission.* The flightpath must coincide with the assigned task; i.e., if the mission is an area search reconnaissance, the flight plan must permit the observer to view and search the entire designated area at frequent intervals to insure immediate detection and location of enemy activities and complete coverage of the assigned mission area.

b. *Time Allocated.* The briefing officer specifies the time allocated for each mission or the time that the mission information is re-

quired. This time element may be necessary to insure maximum aircraft utilization and aviation support and/or to insure that collected intelligence information is disseminated while still valid. The time element may require that the aviator fly the shortest flightpath, giving the observer only a one-pass opportunity to observe preselected areas.

c. *Methods of Reporting.* Radio is the primary means of reporting information as it is obtained. Frequencies, call signs, codes, reporting times, and authentication procedures must be verified prior to flight. In the event of radio failure or denial of radio communications through enemy electronic countermeasures, alternate means may be used such as message drops or landing to contact personnel of friendly units. A debriefing (4-15) will be conducted upon completion of all missions.

d. *Flight Routes.* The flight route is the flightpath from the tactical landing area to, through, and over the forward friendly positions. Coordination must be established between the aviator-observer teams and aviation operations sections, flight coordination centers (FCC), or flight operations centers (FOC) to avoid the hazards of friendly mortar and artillery fires, nuclear weapons, and air defenses. The flight routes must be planned to insure complete coverage of the mission area with minimum exposure of the aviator-observer team to flight hazards and enemy countermeasures.

e. *Altitude.* The mission requirements will dictate the mission altitude. Enemy air defense capabilities also influence both the mission altitude and the altitude flown to and from the observation area. Friendly artillery fires must be considered when planning flight altitudes. See FM 30-20 for additional altitude considerations when employing observation by electronic or photographic means.

(1) *High enemy air defense threat environment.* The encounter of a sophisticated enemy air defense system can be anticipated. Radar guided and heat seeking anti-aircraft weapons will dictate nap-of-the-earth flights on all air observation missions in proximity to enemy units.

(2) *Low enemy air defense threat environment.* Enemy small arms fire and small caliber automatic weapons will present the largest threat to aircraft in the threat environment. Based on these considerations, observation missions normally will be flown at altitudes which afford protection from hostile small arms fire. Here again, the mission requirements will dictate the mission altitude while in the observation area.

f. *Direction of Observation.* The aviator-observer team must consider the approach for an observational pass to insure that the enemy, sun, shadows, terrain features, etc., do not hin-

der, but rather enhance, the observer's opportunity to detect the enemy.

4-11. Crew Coordination. Crew coordination consists of an intercrew briefing, preparation of checklists, and a thorough equipment check. This equipment check includes the aircraft preflight inspection and check, and inspection of any other equipment that may be necessary for the mission; i.e., maps, cameras, sensors, binoculars, flares, etc.

4-12. Duties of the Aviator-Observer Team. In addition to the preflight planning, the aviator-observer team must fly the mission and detect, identify, estimate the size, and determine the location, disposition, and activities of objects. As required by the mission, the team must rapidly record or report all significant observations while the aircraft is operating at varying altitudes, groundspeeds, and altitudes. Emphasis is placed on speed, accuracy, and completeness of information.

a. Detection. Objects must be detected under conditions of excellent concealment and great dispersion, to include temporary or highly mobile objects.

b. Identification. Objects must be accurately identified and promptly reported to permit valid assessment of the situation and application of appropriate countermeasures.

c. Strength Estimation. Accurate reports of strength or size provide additional information about the capabilities and composition of enemy forces. Objects should be reported by actual count or estimated number. Dispersion on the battlefield will result in an increased number of object groups; however, the elevated position of the aerial observer will enhance his capability to estimate the strength of these groups.

d. Object Location. Exact locations of objects are essential, particularly if the object is to be engaged by unobserved fire.

e. Disposition and Activity. Accurate and complete reports on object disposition and activity provide guidance in determining enemy composition and capabilities and locations of highly mobile objects.

4-13. Recording. To provide commanders with accurate information, a systematic method of

recording information observed during the flight must be used. When recording on a map or photograph, an abbreviated term may be used to identify the observed object. The notation may be made directly on the map or photograph at the location where the object or activity was observed. Portable recording instruments, such as tape recorders, may be used by the observer to record observed information. In special situations the observer may use a hand-held camera to photograph sighted objects.

4-14. Reporting. To provide commanders and staffs with critical information during the conduct of the mission, the aviator-observer team must be able to make reports to the requesting unit by means of radio, message drop, or prearranged signals. When circumstances permit, the aviator will land at or near the requesting unit to report pertinent information. If a report is not required while the aircraft is in the air, the debriefing officer forwards a mission report through intelligence channels to units concerned. Although an in-flight report may not be required, the aviator-observer team must constantly evaluate observed information, and report any information that may be of immediate value.

4-15. Debriefing. For maximum information, the same individual should conduct both the preflight briefing and the debriefing of the aviator-observer team. Information is consolidated into two categories—mission and general information.

a. Mission. On debriefing, the aviator-observer team is asked questions covering all aspects of the mission assigned in the preflight briefing.

b. General. Any additional information obtained which was not an assigned mission task, but is of value (such as areas of enemy small arms fire), or any changes in tactical maps and weather data is general information.

4-16. Debriefing Format. Figure 4-1 shows a sample debriefing format to aid the aviator-observer team in compiling mission data to shorten the time spent in debriefing. This format may be modified as the situation requires.

MISSION NO. 3 DATE/TIME 210600 June MAP/PHOTO Daleville Ala. 1:25000
 OBSERVER Greene ORGANIZATION B Co. 20th Arm Bn
 TYPE MISSION Reconnaissance TYPE AIRCRAFT OH

ITEM NO.	OBJECT IDENTIFICATION	MAP/PHOTO LOCATION	OBJECT DESCRIPTION	TIME OF OBSERVATION	REMARKS
1.	APC	318670	Three APC's moving north of Hill 308.	0932	Directed artillery fire.
2.	Hr Mortar (4.2) troops	320690	One mortar dug in; four individuals digging in.	0937	

Figure 4-1. Sample debriefing format.



APPENDIX A

REFERENCES

1. Army Regulations (AR)

40-501	Standards of Medical FITNESS.
&μ-1	Army Aviation: General Provisions and Flight Regulations.
310-25	Dictionary of United States Army Terms (Short Title: AD).
310-50	Authorized Abbreviations and Brevity Codes.
350-1	Army Training.
600-106	Aeronautical Designations and Flying Status for Army Personnel.

2. Field Manuals (FM).

1-15	Aviation Company, Battalion, Group, and Brigade.
1-40	Helicopter Gunnery.
1-100	Army Aviation Utilization.
3-12	Operational Aspects of Radiological Defense.
5-20	Camouflage.
5-34	Engineer Field Data.
5-36	Route Reconnaissance and Classification.
6-40	Field Artillery Cannon Gunnery.
7-20	The Infantry Battalions.
11-40	Tactical Audio-Visual Doctrine.
17-1	Armor Operations.
17-37	Air Cavalry Squadron.
17-95	The Armored Cavalry Regiment.
21-5	Military Training Management.
21-6	Techniques of Military Instruction.
21-26	Map Reading.
21-30	Military Symbols.
24-18	Field Radio Techniques.
30-5	Combat Intelligence.
30-20	Aerial Surveillance—Reconnaissance, Field Army.
30-35	Military Intelligence Battalion, Aerial Reconnaissance Support.
31-36(Test)	Night Operations.
(C) 32-5	Signal Security (SIG SEC) (U).
C)32-20	Electronic Warfare (U).
57-35	Airmobile Operations.
61-100	The Division.
100-5	Operations of Army Forces in the Field.
100-26	The Air-Ground Operations System.
101-5	Staff Officers' Field Manual: Staff Organization and Procedure.

3. Technical Manuals (TM).

1-380-series	(Aerial Observer Programmed Text.)
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4. Army Subject Schedules (ASubjScd).

1-8	Aerial Observer Training.
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5. Department of the Army Pamphlets (DA Pam).

108-1	Index of Army Motion Pictures and Related Audio-Visual Aids.
310-series	(Military Publications Index.)



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